

## Patent claims

1. A method for depositing a layer on a substrate (3) arranged in a process chamber (10) of a process reactor (1) by means of a sequential gas phase deposition, in the course of which at least one first process gas and one second process gas are respectively introduced into the process chamber (10) and removed from the process chamber (10) alternately one after the other, wherein, for the partial removal of at least one of the process gases, the process gas is rarefied by an at least partial pressure equalization of a pressure difference present between a process pressure prevailing in the process chamber (10) and an auxiliary pressure in an auxiliary chamber (20) of the process reactor (1) that is significantly lower at the beginning of the pressure equalization.
- 20 2. The method as claimed in claim 1, wherein the auxiliary pressure at the beginning of the pressure equalization is provided with at most one tenth of the process pressure.
- 25 3. The method as claimed in either of claims 1 and 2, wherein the auxiliary chamber (20) is provided with at least ten times a volume of the process chamber (10).
- 30 4. The method as claimed in one of claims 1 to 3, wherein the pressure difference between the process pressure and the auxiliary pressure during the introduction of one of the process gases is maintained by a pumping operation acting between the auxiliary chamber (20) and the process chamber (10) and the pressure equalization is brought about at least partly by ending the pumping operation.

5. The method as claimed in one of claims 1 to 4,  
wherein the pressure difference between the process  
pressure and the auxiliary pressure while one of  
the process gases is being introduced is produced  
by means of a separating device (11) hermetically  
sealing the process chamber (10) with respect to  
the auxiliary chamber (20) in a closed state and  
pumping out of the auxiliary chamber (20), and the  
10 pressure equalization is brought about at least  
partly by opening of the separating device (11).
15. The method as claimed in one of claims 1 to 5,  
wherein the pressure difference between the process  
pressure and the auxiliary pressure is respectively  
built up after the rarefaction of a first process  
gas by a pumping operation of a pumping device  
producing a pressure difference prevailing between  
the process pressure in the process chamber and the  
auxiliary pressure in the auxiliary chamber and/or  
20 closing of the separating device (11) and  
evacuation of the auxiliary chamber (20).
25. The method as claimed in claim 6, wherein, after  
the switching on of the pumping device and/or the  
closing of the separating device (11), a further  
process gas is introduced into the process chamber  
(10) and residual fractions of the first process  
gas that are in the process chamber (10) are forced  
30 out of the process chamber (10).
35. The method as claimed in one of claims 1 to 7,  
wherein flowing back of the process gas into the  
process chamber (10) is avoided by providing a  
valve device and/or by introducing a further  
process gas into the process chamber (10).

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9. The method as claimed in either of claims 7 and 8, wherein a chemically inert purging gas is provided as the further process gas.
- 5 10. The method as claimed in one of claims 1 to 9, wherein the auxiliary chamber (20) is evacuated during the pressure equalization.
- 10 11. The method as claimed in one of claims 1 to 10, wherein, during the evacuation of the auxiliary chamber (2), a second process gas, having a precursor intended for deposition, is introduced into the process chamber (10).
- 15 12. A process reactor having
  - a process chamber (10) suitable for producing a layer on a substrate (3) by means of a sequential gas phase deposition, in the course of which at least one first process gas and one second process gas are respectively introduced into the process chamber (10) and removed from the process chamber (10) alternately one after the other
  - a susceptor (4), which is arranged inside the process chamber (10) and on which the substrate (3) rests, and
  - feeds (61) for introducing process gases, which comprises an auxiliary chamber (20) for the rarefaction of at least one of the process gases, which auxiliary chamber can be evacuated to an auxiliary pressure significantly lower than a process pressure prevailing in the process chamber (10) during the deposition and is to be alternately connected to the process chamber (10) or separated from the process chamber (10).

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13. The process reactor as claimed in claim 12, which comprises a separating device (11), which in a closed state closes the process chamber (10) with respect to the auxiliary chamber (20) and in an  
5 opened state connects the auxiliary chamber (20) and the process chamber (10).
14. The process reactor as claimed in either of claims 12 and 13, which comprises a pumping device  
10 producing a pressure difference acting between a process pressure in the process chamber (10) and an auxiliary pressure in the auxiliary chamber (20).
15. The process reactor as claimed in one of claims 12 to 14, which comprises a valve device blocking  
15 flowing back of a process gas from the auxiliary chamber (20) into the process chamber (10).